



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification 6 :</b> <b>H04Q 7/38</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 99/33300</b> <b>(43) International Publication Date:</b> 1 July 1999 (01.07.99)
<b>(21) International Application Number:</b> PCT/FI98/01010 <b>(22) International Filing Date:</b> 21 December 1998 (21.12.98) <b>(30) Priority Data:</b> 974590 22 December 1997 (22.12.97) FI <b>(71) Applicant (for all designated States except US):</b> SONERA OY [FI/FI]; Teollisuuskatu 15, FIN-00510 Helsinki (FI). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> GRÖHN, Tuomo [FI/FI]; Hämeentie 70 D 66, FIN-00550 Helsinki (FI). PERÄ, Olli [FI/FI]; Candelinintie 4 B 4, FIN-90570 Oulu (FI). ALA-LUUKKO, Sami [FI/FI]; Paraistentie 18 A 2, FIN-00280 Helsinki (FI). SARKKI, Mika [FI/FI]; Norotie 6 D 41, FIN-01600 Vantaa (FI). <b>(74) Agent:</b> PAPULA REIN LAHTELA OY; Fredrikinkatu 61 A, P.O. Box 981, FIN-00101 Helsinki (FI).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> <i>In English translation (filed in Finnish).</i>
<b>(54) Title:</b> PROCEDURE AND SYSTEM FOR THE TRANSMISSION OF INFORMATION AND SETTING UP OF A TELECOMMUNICATION CONNECTION		
<b>(57) Abstract</b>  <p>Procedure and system for optimisation of the route of a telecommunication connection to be set up in a telecommunication system comprising a mobile switching centre (MSC), a service switching point (SSP), a service control point (SCP), a gateway (GW) and a subscriber register (HLR). In the procedure, the service switching point (SSP) is connected to the service control point (SCP) and the gateway (GW) is connected to the service control point (SCP) and to the subscriber register (HLR). The telecommunication connection to be set up is directed via the service switching point (SSP) to the service control point (SCP). A database query is sent from the service control point (SCP) via the gateway (GW) to the subscriber register (HLR). The subscriber register provides routing information, on the basis of which an optimal route to the mobile switching centre under which the B-subscriber is located is determined.</p> <div> <pre> graph TD     GW[GW] --- HLR[(HLR)]     GW --- SCP[SCP]     SCP --- SSP[SSP]     SSP --- MSC[MSC]   </pre> </div>		

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point of the intelligent network is thus enabled to use the subscriber data of the GSM network.

In a preferred embodiment of the invention, the subscriber register is the home location register  
5 of the GSM system.

The invention allows optimal routing to the mobile switching centre under which the B-subscriber is located. If, according to the data in the visitor location register, the subscriber cannot be reached,  
10 corresponding information is obtained. If the subscriber has transferred his/her calls to another number using the CFU (Call Forwarding Unconditional) supplementary service, this will also be known and the call can be routed to the forward number.

The solution of the invention does not require any changes in the elements of the mobile communication network or in the intelligent network because the invention implements the service by using a separate  
15 MAP-INAP base.

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#### LIST OF ILLUSTRATIONS

In the following, the invention will be described in detail by the aid of an embodiment example,  
25 wherein

Fig. 1 presents a system according to the invention,

Fig. 2 presents an example of signalling in a preferred embodiment of the procedure of the invention,  
30 tion,

Fig. 3 presents an example of signalling in a preferred embodiment of the procedure of the invention, and

Fig. 4 presents an example of signalling in a preferred embodiment of the procedure of the invention  
35 in an error situation.

register (VLR). The home location register returns the response to the signalling query (HLR-response) to the gateway, which performs a conversion from signalling query response (HLR-response) to database query response (DB-response). The signalling query response (HLR-response) consists of routing information, preferably a roaming number.

Fig. 3 presents an example of signalling in a procedure according to the invention in a situation where the B-subscriber has forwarded his/her calls to a C-number. From the service control point (SCP), a database query (DB-query) is sent to obtain routing information (MSRN). The database query is directed to the MAP-INAP gateway (GW), where a conversion from database query into signalling query (Send.Routing.Inf) is performed. Next, the signalling query is sent from the gateway to the B-subscriber's home location register (HLR), where, based on the data in the home location register, a response to the signalling query is defined. The home location register HLR returns the response to the signalling query (Fwd.To.Number) to the gateway, which performs a conversion from signalling query response to database query response (DB-response). In the case of the present example, the response (Fwd.To.Number) to the signalling query is a C-number.

Fig. 4 presents an example of signalling in the procedure of the invention in a situation where the B-subscriber can not be reached or there is a malfunction in the telecommunication system. A database query (DB-query) is sent from the service control point (SCP) to obtain routing information. The database query is directed to the MAP-INAP gateway (GW), where a conversion from database query into signalling query is performed. Next, the signalling query (Send.Routing.Inf) is sent from the gateway to the B-

subscriber's home location register (HLR). Based on the information in the home location register, a response (Routing.Inf.Error) to the signalling query is defined. If the subscriber terminal has been shut off  
5 or the subscriber is outside the receiving area, then the response (Routing.Inf.Error) to the signalling query contains data indicating that the subscriber can not be reached. If there is a malfunction in the system, corresponding information can also be given to  
10 the service control point in the response (Routing.Inf.Error) to the signalling query. The home location register returns the signalling query response to the gateway, which performs a conversion from signalling query response to database query response (DB-  
15 error).

The present application is based on the earlier Finnish application FI 982168 "Procedure and system for the transmission of information and setting up of a telecommunication connection", which has been  
20 filed by the same applicant as the present application and is included here by this reference.

The invention is not restricted to the examples of its embodiments described above, but many variations are possible within the scope of the inventive idea defined by the claims.  
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## CLAIMS

1. Procedure for optimisation of the route of  
a telecommunication connection to be set up in a tele-  
communication system comprising a mobile switching  
5 centre (MSC), a service switching point (SSP), a serv-  
ice control point (SCP), a gateway (GW) and a sub-  
scriber register (HLR), in which procedure the service  
switching point (SSP) is connected to the service con-  
10 trol point (SCP) and the gateway (GW) is connected to  
the service control point (SCP) and to the subscriber  
register (HLR), and in which procedure the telecommu-  
nication connection to be set up is directed via the  
service switching point (SSP) to the service control  
15 point (SCP) and a database query is performed from the  
service control point (SCP), characterised  
in that the database query is addressed to the sub-  
scriber register (HLR) and, based on the response to  
the database query, an optimal route to the mobile  
20 switching centre is determined.

2. Procedure as defined in claim 1, characterised in that

the database query is converted in the gateway  
(GW) into a signalling query;

25 the signalling query is sent to the subscriber  
register (HLR);

based on the data in the subscriber register  
(HLR), a response to the signalling query is defined;

the response to the signalling query is sent to  
30 the gateway (GW);

the response to the signalling query is converted  
into a response to the database query;

the response to the database query is returned to  
the service control point (SCP);

routing information corresponding to the optimal telecommunication connection is generated on the basis of the response to the database query; and

5 based on the routing information, a telecommunication connection to the mobile switching centre is set up.

3. Procedure as defined in claim 1 or 2, characterised in that the response to the signalling query contains routing information.

10 4. Procedure as defined in claims 1 - 3, characterised in that the routing information consists of a roaming number, preferably the MSRN number (MSRN, Mobile Subscriber Roaming Number).

15 5. Procedure as defined in any one of claims 1 - 4, characterised in that the gateway is an MAP-INAP gateway comprising a database interface and a subscriber register interface.

20 6. Procedure as defined in any one of claims 1 - 5, characterised in that the signalling query is an MAP query (MAP, Mobile Application Part).

7. Procedure as defined in any one of claims 1 - 6, characterised in that the database query is an SDP query (SDP, Service Data Point).

25 8. Procedure as defined in any one of claims 1 - 7, characterised in that the subscriber register (HLR) is the home location register.

9. System for optimisation of the route of a telecommunication connection to be set up in a telecommunication system comprising a mobile switching centre (MSC), a service switching point (SSP), a service control point (SCP), a gateway (GW) and a subscriber register (HLR), in which system the service switching point (SSP) is connected to the service control point (SCP) and the gateway (GW) is connected to  
30 the service control point (SCP) and to the subscriber register (HLR), and in which system the telecommunica-  
35

tion connection to be set up is directed via the service switching point (SSP) to the service control point (SCP), characterised in that the gateway (GW) comprises means for handling a database query, a  
5 signalling query, a database query response and a signalling query response.



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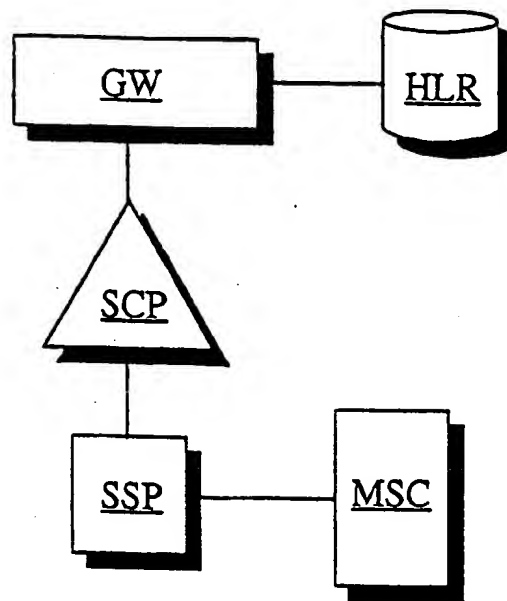


Fig 1

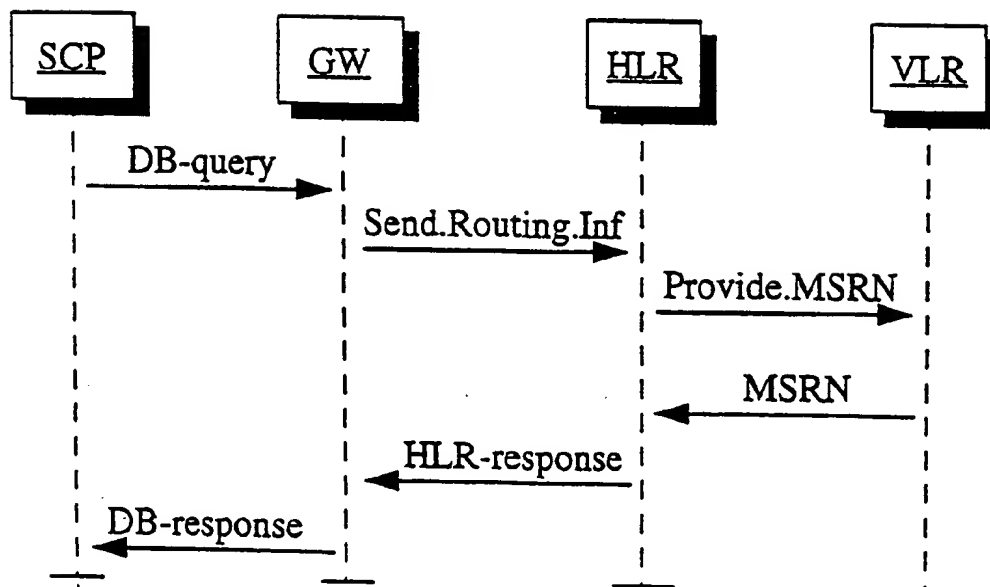


Fig 2

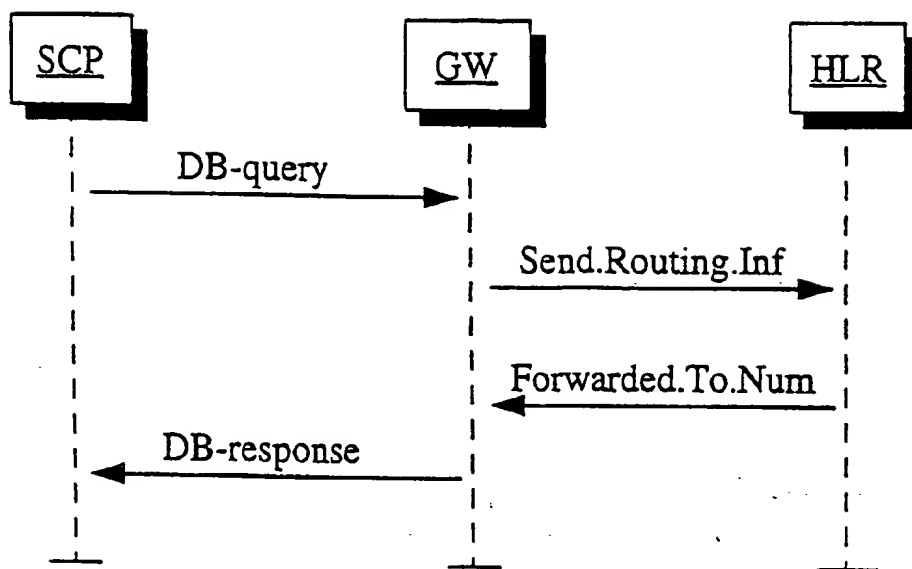


Fig 3

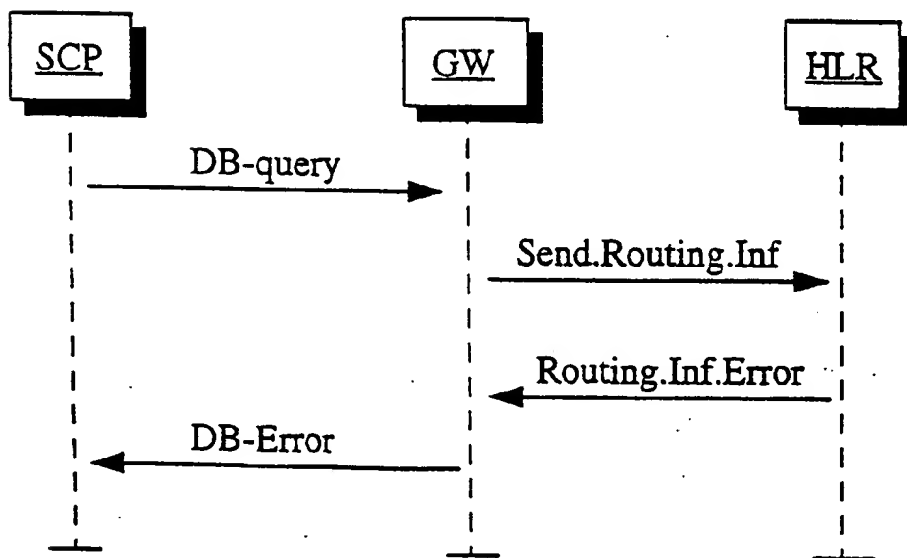


Fig 4

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 98/01010

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9417644 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 4 August 1994 (04.08.94), figures 2,3, abstract --	1-9
Y	US 5839072 A (GUNG-SHIH CHIEN), 17 November 1998 (17.11.98), figure 6, abstract --	1-9
A	WO 9714262 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 17 April 1997 (17.04.97), page 4, line 13 - page 5, line 4 --	1-9
A	WO 9856206 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 10 December 1998 (10.12.98) --	

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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